



Nortel Networks Symposium Express Call Center

Voice Services Card Maintenance and Troubleshooting Guide

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Voice Services Card Maintenance and Troubleshooting Guide

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NTHF77AA Voice Services card test and debug capabilities

Introduction

The NTHF77AA Voice Services card provides maintenance and diagnostic features to identify and clear fault conditions. Also included are upgrade features that require the user to have access to the card's operating system (VxWorks).

The Voice Services card features include

- self-test features
- factory-test features
- debug features (user name and password required)
- application loadware upgrade
- Digital Signal Processing (DSP) loadware upgrade
- auxiliary processor loadware upgrade
- VxWorks shell debug utilities
- setting the Internet Protocol address

Self-test features

The Voice Services card runs various diagnostics to detect hardware faults and ensure correct operation. The tests include

- 8051 power-up self-tests
- BIOS diagnostics
- base code self-tests

Progress information on self-tests is available through the serial port on the Voice Services card.

Factory-test features

Introduction

Factory-test features include the HEX Display, Status LED, and Reset Switch.

HEX display

The Voice Services card includes a HEX LED display to provide status information during maintenance operations. During power-up and diagnostic tests, this display provides a visual indication of progress, and information if a failure is detected. The HEX LED display codes are indicated in Table 2, "HEX display codes," on page 15.

During normal operation, the display cycles through the number of enabled Voice Services (M2616) ports, the number of booted DSP ports, the number of channels authorized by the keycode, and the total channel capacity of the card. For example, the HEX display appears.

Table 1: Hex display codes during normal operation

Display field	Meaning
A:XX	Number of enabled Voice Services Ports.
D:XX	Number of installed DSP ports.
K:XX	Capacity of card enabled via Keycode.
C:XX	Current capacity of card (smallest of A, D, and K).
MAIN	The card is in maintenance mode (all ports are disabled).

You can also use the RS-232 port to monitor the progress of self-tests. Messages indicating the completion of each self-test phase, as well as any detected faults, print to this port.

Status LED

A single red LED on the faceplate indicates the enabled/disabled status of the Voice Services card, and also provides an indication of the status of the power-on self-test.

The LED is OFF if

- the channel capacity of the Voice Services card is non-zero
and
- the card is in the normal mode of operation

The LED is ON if

- the channel capacity of the Voice Services card is zero
or
- the card is disabled from LD 32

Reset switch

A reset switch on the faceplate allows an operator to manually reset the card without having to power down. This switch is normally used to clear a fault condition during setup or non-traffic periods, and to check firmware and loadware versions.

CAUTION

Risk of equipment damage



Before using the Reset switch, ensure that the Voice Services card has been disabled in LD 32 using the DISC command. Otherwise, some of the ports may cause an OVD error on the Meridian 1 CPU and become disabled when the card resets. Once the card is active again (the HEX display has passed T:21 state), reenable the card in LD 32 using the ENLC command.

Table 2: HEX display codes

Display code	Definition
T:00	Initialization
T:01	Testing Internal RAM
T:02	Testing ALU
T:03	Testing address modes
T:04	Testing Boot ROM
T:05	Testing timers
T:06	Testing watchdog
T:07	Testing external RAM
T:08	Testing Host DPRAM
T:09	Testing DS30 DPRAM
T:10	Testing for presence of dongle (see note below)
T:11	Testing flash memory
T:12	Programming PCI FPGA
T:13	Programming DS30 FPGA
T:14	Programming CEMUX FPGA
T:15	Programming DSP FPGA
T:16	Testing CEMUX interface
T:17	Testing EEPROM
T:18	Booting 486, waiting for response with self-test information
T:19	Waiting for application start-up message from 486

Table 2: HEX display codes (continued)

Display code	Definition
T:20	cardLAN enabled, waiting for Request Config. Message
T:21	cardLAN operational, A07 enabled, display now under host control

Note: The security dongle is required for normal Voice Services card operation. During installation of the Symposium Express Call Center server software, you enter a keycode number. This keycode is matched to the dongle, and authorizes a number of channels for use.

The Voice Services card reports a missing dongle during bootup through a message on the serial connection. Once a dongle is inserted, the serial number is reported during bootup.

Debug terminal access

The Voice Services card provides two RS-232 ports—one accessible via the NTMF94BA backplane cable, and the other using the maintenance port on the card faceplate. Only the backplane cable labeled COM1 provides access to the Voice Services card for both OA&M and debugging purposes. The pinouts for the RS-232 ports are listed in Table 4, “RS-232 backplane signals,” on page 17, and in Table 5, “Faceplate mini-DIN connector,” on page 18. Messages indicating the completion of each self-test phase, as well as any detected faults, are printed.

Table 3: Serial port settings

Bits Per Second	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

CAUTION**Risk of equipment damage**

Two serial connectors are available—the mini-DIN connector on the faceplate, and the backplane cable marked COM1. However, you can only use one connector at one time, as both are connected to the same serial port.

When configuring the serial communications program, you must use the settings given in Table 3, “Serial port settings.”

Table 4: RS-232 backplane signals

Pin No.	Signal	Dir	Description
69A	SGNDA	C	Port A Signal Ground
69B	BDCDA-	I	Port A Data Carrier Detect
73A	BSINA-	I	Port A Serial Data In
73B	BSOUTA-	O	Port A Serial Data Out
74A	BDTRA-	O	Port A Data Terminal Ready
74B	BCTSA-	I	Port A Clear To Send
75A	BDSRA-	I	Port A Data Set Ready
75B	BRTSA-	O	Port A Request To Send

Table 4: RS-232 backplane signals (continued)

Pin No.	Signal	Dir	Description
76A	SGNDB	C	Port B Signal Ground
76B	BSINB-	I	Port B Serial Data In
77A	BSOUTB-	O	Port B Serial Data Out
77B	BDCDB-	C	Port B Data Carrier Detect
78A	BDTRB-	O	Port B Data Terminal Ready
78B	BDSRB-	I	Port B Data Set Ready

Table 5: Faceplate mini-DIN connector

Pin No.	Signal	Dir	Description
1	BDTRB-	O	Port B Data Terminal Ready
2	BSOUTB-	O	Port B Serial Data Out
3	BSINB-	I	Port B Serial Data In
4	SGND	C	Signal Ground
5	BSINA-	I	Port A Serial Data In
6	BCTSA-	I	Port A Clear To Send
7	BSOUTA-	O	Port A Serial Data Out
8	BDTRA-	O	Port A Data Terminal Ready

Debug features

While the Voice Services card is booting, the 8051 auxiliary processor has control of the serial port, and uses it to provide debug information, progress of self-tests, and so on. Once the 8051 releases the main processor (i486) from reset, the main processor by default grants VxWorks shell access through this port. The Voice Services card also supports remote access to the shell via a telnet connection.

Once the card is operational, the RS-232 port can be used to monitor cardLAN and Time Compression Multiplexing (TCM) signaling between the card and the Meridian 1 system.

Startup messages

When the card boots, a variety of diagnostic messages print to the serial port, including hardware test results. These messages also include firmware version information:

```
VPS Firmware Rls 5.0
8051XA Firmware Version 6.3 29 August 2000
(C) Nortel Networks Inc. 2000
32K External RAM detected
8K DPRAM detected
Dongle serial number: 10062387
All FPGAs are configured
All self-tests have passed
1234
Memory Test Completed OK

BIOS ROM Version 4.1
Copyright: Nortel Networks Inc., 1996-2000
...
```

VxWorks shell

The VxWorks shell is used for performing basic administrative and management tasks, the most important of which is loadware upgrade. You can access the VxWorks shell through a serial connection from a PC or a telnet connection.

The shell is protected from unauthorized access by a username and password. This password is common across FTP, telnet, and the serial port. If the shell is idle for a period of time, the shell is logged off, and the password and username must be reentered to gain access. This time-out defaults to 10 minutes, but it can be set to any value between 30 and 4095 seconds (1 hour 8 minutes 15 seconds) using the *shell* function *shellTimeoutSet n*, where *n* is the desired time-out in seconds. The current value of the shell time-out in seconds is returned by the shell function *shellTimeoutGet*:

```
-> shellTimeoutSet 600
-> shellTimeoutGet
value = 600 = 0x258
```

The shell time-out is stored in NVRAM, so changes are maintained across a restart.

Note: Once the shell username and password have been successfully entered, the user has complete access to all the VxWorks commands. Incorrect usage of some shell commands causes the voice processing (VP) services loadware to restart, and may change operational behavior.

To exit from the shell and return to the logon: prompt at any time, type the command **logout**.

Application loadware upgrade

The Voice Services card stores up to two versions of loadware in Flash. This mechanism ensures that if there is a power outage or other failure during upgrade, the card still has a valid load in Flash. A small boot code segment is located in the BIOS Flash area, which chooses the “newest” load from one of two Flash banks to uncompress into DRAM. Once the uncompress has completed, execution switches to the code entry point in DRAM.

During upgrade, the Flash bank with the oldest load is erased and the new load is stored in this area. Once the upgrade has completed successfully, the new load is marked as "newer." If the upgrade fails for some reason (for example, checksum corruption), the older load remains the boot image. A failed upgrade will not checksum correctly and, therefore, will not be selected by the load chooser algorithm in the boot ROM. You must restart or reset the card for the new loadware to execute.

Before an upgrade can be performed, the Voice Services card must first be disabled from LD 32 using the DISC command. The Voice Services card service on the Symposium Express Call Center must also be stopped. The card is reenabled, and the service is restarted after the Voice Services card upgrade is complete.

There are two options for upgrading the loadware. The first option is to use an FTP Client to connect to the card, copy the loadware onto the PCMCIA /A: or /B: disk of the card, and then do the upgrade from there using the command *upgradePCMCIA*. This option takes the loadware file from the PCMCIA disk and programs it into Flash. The second option is to place the loadware file on an FTP server, and use the *upgrade* command to retrieve the file from the FTP server and program it into Flash. Both options are described below.

To upgrade the loadware from the PCMCIA disk

For information on upgrading the loadware, see the *Symposium Express Call Center Voice Services Card Installation Guide*.

To upgrade the loadware from an FTP server

To upgrade the loadware over the network from an FTP server, you must copy the loadware binary file to an FTP server, and then run the upgrade.

- 1 From the Windows Start menu, choose Programs → MSDOS Prompt.

Result: The MSDOS Prompt window appears.

- 2 Type **ftp**, and then press Enter.
- 3 Type **open aaa.bbb.ccc.ddd**, and then press Enter.
aaa.bbb.cc.ddd is the IP address of the Voice Services card.
- 4 At the ftp prompt, type **vscard**, and then press Enter.
- 5 Type **vpsdseuser**, and then press Enter.

- 6 The `password>` prompt appears.
- 7 Enter the appropriate password, and then press Enter.
- 8 Type **bin**, and then press Enter.
Result: The data connection is set to binary mode.
- 9 Type **put filename.mms**
 where *filename* is the latest version of the loadware.
Result: The loadware file transfers.
- 10 Type **bye** to close the connection.

To run the upgrade

Use the upgrade command in the VxWorks shell:

```
-> upgrade "server IP address", "userid", "password",  
"path", "filename.mms" <CR>
```

Note: The *userid* and *password* are those of the FTP server, the *path* is the path to the file on the FTP server, and the *filename* is the latest version of the loadware.

```
Connecting to <server IP address>...  
connected to <server IP address OK>  
Updating sector: 16..17..18..19..20..21..22..23..file  
read complete  
Program Address = 0xf9900000, Checksum =  
0x51a4737d, length = 0x76338  
Upgrade completed OK  
Reboot the pack to run new loadware  
value = 0 = 0x0  
-> sysReboot
```

Note: The updated sectors for Bank 1 start at sector 16 (as in the example above), whereas the start sector for Bank 0 is sector 0. Successive successful upgrades alternate between banks for storing the upgrade image.

The Voice Services card must be disabled via LD 32 on the Meridian 1 switch before an upgrade can be executed. Once the upgrade is complete, the card can be reenabled via LD 32. For more information, see the *Symposium Express Call Center Voice Services Card Installation Guide*.

The Voice Services card service on the Symposium Express Call Center server must also be disabled before an upgrade, and restarted after the upgrade is complete.

Voice prompt file system upgrade

The voice prompt file system can be upgraded using FTP. The Voice Services card acts as an FTP server for this procedure. Clients can log on to the Voice Services card and update the voice prompt files on the PCMCIA card-based Flash disk. This function should only be performed while the Voice Services card is idle (not handling calls).

A PCMCIA card inserted in the front panel A: socket always appears as the DOS volume "/A:". A PCMCIA card inserted in the internal B: socket is mounted as DOS volume "/B:". After logging on to the Voice Services card by FTP, the command `cd "/A:"` or `cd "/B:"` must be executed to access the desired disk.

Note: Double quotes are needed around the disk name.

The VxWorks FTP server supports the following commands from an FTP client:

get/mget - Get a file or files from the remote file system.

put/mput - Put a file or files on the remote file system.

mkdir/rmdir - Make or remove a directory on the remote file system.

delete/mdelete - Remove a file or files from the remote file system.

Note: Nortel Networks recommends that the number of files in a directory not exceed 300.

Voice prompt backup

You can use FTP to back up the PCMCIA card disk. As the disk contains all prompts for use with Symposium Express Call Center Voice Services, Nortel Networks recommends that the contents be backed up periodically in case of disk corruption, or in case prompts are deleted in error.

Use a command line FTP client to change to each directory on the PCMCIA disk, and the command *mget* to get the files you want to back up. Alternatively, use a graphical FTP client to copy the entire PCMCIA disk at once.

Each error consists of a four-digit hex identifier and a time stamp. The first digit of the identifier corresponds to the task that logged the error; the other three digits make up a unique error number. Each of the following tables gives a brief explanation for the fatal errors logged by every task:

Table 7: Maintenance task fatal errors

Error ID	Description
0x1001	Serious hardware fault found during bootup
0x1002	VP Application startup failed
0x1003	Error initializing Maint Task
0x1004	Process incoming base code events other than VP Application tasks: task in ERROR state
0x1005	A VP task failed self-test
0x1006	Aries Task failed to go operational
0x1007	VP Application Task failed to go operational
0x1008	Task suspended itself three times

Table 8: Networking task fatal error

Error ID	Description
0x12c3f84	Duplicate IP address used when commissioning the card

Table 9: Server task fatal fatal error

Error ID	Description
0x2001	Ethernet device has no IP address
0x2002	Error opening VP-AP Master socket
0x2003	Error binding a network address (name) to the socket
0x2004	Error enabling connections to the socket

Card utilization

You can monitor the utilization per channel on the Voice Services card. This can be useful to ensure that the card is not overloaded with traffic.

To monitor card utilization

- 1 Log on to the Voice Services card.
- 2 To start monitoring, type **usageClkStart**.
- 3 To end monitoring, type **usageClkStop**.
- 4 To get a report of the data collected, type **usageReport**.

Fatal error logging

When the Voice Services card encounters a problem that is classed as a *Fatal Error*, it logs the error in NVRAM and, if relevant, prints messages to the VxWorks shell. The Voice Services card is then restarted. If a *Fatal Error* is logged three times within a certain period, the tMaint task suspends itself on startup to prevent further restarts and to allow debugging of the errors.

The NVRAM stores up to six fatal errors, starting with the most recent one. The command *printAllErrors* is used to show the errors, and appears as follows:

```
-> printAllErrors
Error (1): Error Code 0x3001, logged at 23:35:11 05/02/
1998
Error (2): Error Code 0x4004, logged at 23:33:13 05/02/
1998
Error (3): Error Code 0x5003, logged at 23:31:02 05/02/
1998
Error (4): Empty
Error (5): Empty
Error (6): Empty
value = 30 = 0x1e
```

VxWorks shell debug utilities

Several debug utilities are available from the VxWorks shell, which can be used to print the state of certain global variables. The following table provides a list of available debug commands:

Table 6: Debug commands

Command	Description
printAllErrors	Prints logged fatal errors.
getAriesState	Prints current state of all 32 M2616 (Aries) sets.
printAriesState n	Prints globals associated with M2616 (Aries) set 'x'.
printVpGlobs	Prints all VP globals.
printVpChannel n	Prints globals associated with VP channel 'x'.
tr "tMaint"	Resumes suspended task 'tMaint'.
swInfoGet	Prints the loadware, DSP, and 8051XA firmware versions.
ifShow	Prints the IP and Ethernet addresses.
inetstatShow	Prints the status of all network links.
ping "10.0.0.2",x	Pings IP address 10.0.0.2 'x' number of times. Press Ctrl+C to stop to return to VxWorks shell.

Table 9: Server task fatal error (continued)

Error ID	Description
0x2005	Error in accepting connection from a client
0x2006	Error; Main Server Task loop exited

Table 10: VP application task fatal errors

Error ID	Description
0x3001	Malloc failed during DSP card Removal
0x3002	Malloc failed during handling of channelRelease action
0x3003	Malloc failed during handling of clientRelease action
0x3004	Malloc failed during handling of clientRelease action
0x3005	Malloc failed during handling of modifycardState action
0x3006	Malloc failed during handling of EnableDigitNotification action
0x3007	Malloc failed during handling of action to Aries task
0x3008	Message send to the VP Application Task fails
0x3009	Message send to the VP Application Task fails
0x300A	Malloc failed during posting of event to all clients
0x300B	Malloc failed during shell function call
0x300C	Malloc failed during retrieval of segmentSet Id
0x300D	Malloc failed during creation of segment path name
0x300E	Malloc failed during creation of segment path name
0x300F	Malloc failed during copying of action
0x3010	Channel in incorrect state while verifying generateDTMF action

Table 10: VP application task fatal errors (continued)

Error ID	Description
0x3011	Channel in incorrect state while verifying stopVoice action
0x3012	Channel in incorrect state while verifying playAnnouncement action
0x3013	Channel in incorrect state while verifying collectDigits action
0x3014	Malloc failed during creation of bitmapped array
0x3015	Malloc failed during creation of bitmapped array
0x3016	Realloc failed during changing of bitmapped array
0x3017	Malloc failed during copying of bitmapped array
0x3018	Malloc failed during handling of DSP card removal
0x3019	Malloc failed during handling of DSP card removal
0x301A	Malloc failed during channel creation
0x301B	Transaction error during prompt playback
0x301C	Transaction error during stopping of prompt playback
0x301D	Malloc failed during request creation
0x301E	Malloc failed during request creation
0x301F	Transaction error during emptying of request list
0x3020	Malloc failed during request creation
0x3021	Malloc failed during request creation
0x3022	Incorrect channel state when handling dsp play finished message
0x3023	Malloc failed during handling of dsp play finished message

Table 10: VP application task fatal errors (continued)

Error ID	Description
0x3024	Invalid action type found during handling of dsp play finished message
0x3025	Incorrect channel state when handling dsp play finished message
0x3026	Malloc failed during handling of dsp play finished message
0x3027	Invalid action type found during handling of dsp play finished message
0x3028	Malloc failed during handling of dsp digit detection message
0x3029	Malloc failed during forwarding of digit event
0x302A	Malloc failed during handling of channelAcquire error
0x302B	Malloc failed during handling of channelAcquire error
0x302C	Malloc failed during initialization of VP App task globals
0x302D	Error during channel acquire; channel not in enabled state
0x302E	Malloc failed during handling of channelSplit RFA
0x302F	Malloc failed during handling of channelSplit RFA
0x3030	Malloc failed during handling of clientMessage
0x3031	Malloc failed during handling of digitTimeoutEvent
0x3032	Malloc failed while searching for a free transaction
0x3033	Malloc failed while searching for a free transaction

Table 11: Aries task fatal errors

Error ID	Description
0x4002	Malloc failed during handling of channelAcquire action
0x4003	msgQSend failed after makeCallTimer timeout
0x4004	msgQSend failed after transferCallTimer timeout
0x4005	msgQSend failed after addOnCallTimer timeout
0x4006	msgQSend failed after noHoldConferenceCallTimer timeout
0x4007	Malloc failed during handling of system companding law message
0x4008	Malloc failed during handling of system companding law message
0x4009	Malloc failed during sending of cardReset message to Meridian Manager task
0x400A	Malloc failed during forwarding of an RFA message to the VP App task
0x400B	msgQSend failed during forwarding of an RFA message to the VP App task
0x400C	Malloc failed during forwarding of an RFA message to the VP App task
0x400D	msgQSend failed during forwarding of an RFA message to the VP App task
0x400E	Malloc failed during forwarding of an Event to the VP App task
0x400F	msgQSend failed during forwarding of an Event to the VP App task
0x4010	Malloc failed during forwarding of a displayEvent to the VP App task

Table 11: Aries task fatal errors (continued)

Error ID	Description
0x4011	Malloc failed during forwarding of a displayEvent to the VP App task
0x4012	msgQSend failed during forwarding of an Event to the VP App task
0x4013	Error; Main Aries Task loop exited
0x4015	msgQReceive failed in Aries task input queue
0x4016	Malloc failed during handling of message from VP App task
0x4017	Error; Aries Audit task loop exited
0x4018	Malloc failed during construction of DS30 message
0x4019	Malloc failed during construction of DS30 message
0x401A	Malloc failed during extraction of DS30 message from Meridian Manager
0x4020	msgQSend failed after answerCallTimer timeout
0x4021	msgQSend failed after disconnectCallTimer timeout
0x4022	msgQSend failed after conferenceCallTimer timeout
0x4023	msgQSend failed after retrieveOriginalTimer timeout
0x4024	msgQSend failed after channelReleaseTimer timeout
0x4025	msgQSend failed after retryReleaseTimer timeout
0x4026	msgQSend failed after finalRetryTimer timeout
0x4028	Error in creating ring buffer while initializing Aries task
0x4030	Error in filling ring buffer when sending key press message to Meridian Manager

Table 11: Aries task fatal errors (continued)

Error ID	Description
0x4031	Error in filling ring buffer when sending message to Meridian Manager
0x4032	Error in filling ring buffer when sending message to Meridian Manager
0x4033	Error in filling ring buffer when sending message to Meridian Manager
0x4034	Error in filling ring buffer when sending message to Meridian Manager
0x4035	Error in filling ring buffer when sending message to Meridian Manager
0x4038	Error in retrieving characters from a ring buffer
0x4039	Error in retrieving characters from a ring buffer
0x403A	Error in retrieving characters from a ring buffer
0x403B	Error in retrieving characters from a ring buffer
0x403C	Error: Meridian Manager Send Queue task loop exited
0x403F	Malloc failed while constructing a DS30 message
0x4040	msgQSend failed after faultTimer timeout
0x4041	msgQSend failed after lampUpdateRequestTimer timeout

Table 12: Client task fatal errors

Error ID	Description
0x5001	Malloc failed during action creation
0x5002	Malloc failed during sending of card event state
0x5003	Malloc failed during retrieval of message from socket

Table 12: Client task fatal errors (continued)

Error ID	Description
0x5004	Malloc failed while extracting an IE string
0x5005	Malloc failed while extracting a Channel List IE
0x5006	Malloc failed while flushing a socket
0x5007	Malloc failed during sending of result fail message
0x5008	Malloc failed during handling of playAnnouncement message
0x5009	Malloc failed during handling of collectDigits message
0x500A	Malloc failed during sending of collectDigits result
0x500B	Malloc failed during handling of promptAndCollectDigits message
0x500C	Malloc failed during sending of promptAndCollectDigits result
0x500D	Malloc failed during sending of enableDigitNotification result
0x500E	Malloc failed during sending of clientRegistration result
0x500F	Malloc failed during forceRESET function

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